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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,371	01/02/2002	Gerald W. Gibson JR.	47070/MJM/A717	9263
23363	7590	06/23/2004	EXAMINER	
CHRISTIE, PARKER & HALE, LLP			CHU, CHRIS C	
PO BOX 7068			ART UNIT	
PASADENA, CA 91109-7068			PAPER NUMBER	
			2815	

DATE MAILED: 06/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N . 10/038,371	Applicant(s) GIBSON ET AL.	
	Examiner Chris C. Chu	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11 - 15 is/are allowed.
- 6) ☒ Claim(s) 1, 3 - 5 and 8 - 10 is/are rejected.
- 7) ☒ Claim(s) 2, 6 and 7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/24/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Appeal Brief

1. In view of the appeal brief filed on March 25, 2004, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 3 – 5, 9 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Chooi et al. '891.

Regarding claim 1, Chooi et al. discloses in e.g., Fig. 5, column 3, lines 16 – 23, and column 4, lines 4 – 21 a semiconductor product comprising a barrier layer (30 and 40) disposed between a copper-containing structure (20 and 11) and a low-k dielectric film (50), said barrier layer (30 and 40) comprising a composite film structure including a nitrogen-containing, substantially oxygen-free first film (30) forming a boundary with said copper-containing structure and an oxygen-containing, substantially nitrogen-free second film (40) forming a boundary with said low-k dielectric film.

Regarding claim 3, Chooi et al. discloses in e.g., Fig. 5, column 3, lines 16 – 23, and column 4, lines 4 – 21 first film comprising silicon nitride and said second film comprising silicon dioxide.

Regarding claim 4, Chooi et al. discloses in e.g., Fig. 5, column 3, lines 16 – 23, and column 4, lines 4 – 21 said copper-containing structure (20 and 11) comprising a surface including a copper wire (20) formed within an insulating material (since the element 20 is an interconnected pattern (e.g., column 3, lines 11 - 19), inherently the element 20 is formed within an insulating material.).

Regarding claim 5, Chooi et al. discloses in e.g., Fig. 5, column 3, lines 16 – 23, and column 4, lines 4 – 21 said barrier layer (30 and 40) being formed on said copper-containing structure (20 and 11) and said low-k dielectric film (50) is formed on said barrier layer.

Regarding claim 9, Chooi et al. discloses in e.g., Fig. 5 and column 4, lines 17 – 21 said low-k dielectric film having a dielectric constant less than 3.5.

Regarding claim 10, Chooi et al. discloses in e.g., Fig. 5, column 3, lines 16 – 23, and column 4, lines 4 – 21 a semiconductor product comprising a barrier layer (30 and 40) disposed between a readily-oxidizable conductive material (20) and a low-k dielectric film (50), said barrier layer comprising a composite film structure including a nitrogen-containing, substantially oxygen-free first film (30) forming a boundary with said conductive material and an oxygen-containing, substantially nitrogen-free second film (40) forming a boundary with said low-k dielectric film.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chooi et al. in view of Passemard '053.

Chooi et al. discloses the claimed invention except for said low-k dielectric film being formed of SiOC-H. However, Passemard discloses in e.g., Fig. 4 and column 5, lines 31 – 60 a low-k dielectric film (12) being formed of SiOC-H. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Chooi et al. by using the SiOC-H for the low-k dielectric film as taught by Passemard. The ordinary artisan would have been motivated to modify Chooi et al. in the manner described above for at least the

Art Unit: 2815

purpose of providing resistance to abrasion and copper diffusion, good chemical compatibility, low leakage current, good etch selectivity between underlying insulating layers. It is of note that SIOC-H is a functional equivalent to the low k dielectric layer disclosed in Chooi et al. (column 5, lines 34 and 35).

Allowable Subject Matter

6. Claims 2, 6, 7 and 11 – 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (see the previous rejection for the details).

Furthermore, claims 11 – 15 are allowed (see the previous rejection for the details).

Response to Arguments

7. Applicant's arguments, see pages 4 - 7, filed March 25, 2004, with respect to the rejection(s) of claim(s) 1 and 10 under 35 USC § 102(e) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art references.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Zhao, Jang et al. and Cave et al. disclose interconnection structures.

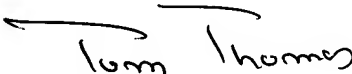
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c.
6/16/04 6:18:53 PM


TOM THOMAS
SUPERVISORY PATENT EXAMINER
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